

Recreational Waterborne Illnesses: What Can We Learn From National Reporting Systems?

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Outline of Presentation

- **Recreational water**
 - magnitude of exposure
 - transmission, illness, water contamination
- **Waterborne disease surveillance**
 - what it can and can't tell us
 - trends, pathogens
- **Prevention**

Swimming Exposure

- Swimming is the second most popular sport activity for U.S. men and women
- 61,353,000 people swim at least 6 times per year (age > 7 years)
- 57% of all U.S. children ages 7-17 swim at least 6 times per year

> 368 million person-visits annually to U.S. swimming venues

Association between Swimming in Marine/Fresh Waters and Illness

- **Most epidemiologic studies associate swimming with GI illness**
- **Repeated in various countries/sites**
- **Illness occurs days to weeks after exposure**
- **Dose response with increasing fecal indicators**

Spectrum of Illness Associated with Recreational Water Use

- **GI illness**
- **Skin infections**
 - athletes foot, dermatitis, folliculitis, "swimmers itch"
- **Otitis externa/conjunctivitis**
- **Respiratory infections**
- **Meningoencephalitis**
- **Misc.-hepatitis, leptospirosis**
- **Urinary tract infections?**

Communal bathing permits entry through

- **anus, urethra, skin, mouth, nose, eyes, ears, cuts**

Recreational Water: An Efficient Vehicle for Infectious Disease Transmission

- **High exposure in US**
- **High bather density**
- **Incontinent children, animals, point-source**
- **Low infectious dose (10-100 pathogens)**
- **Profuse/prolonged shedding (weeks)**
- **Pathogens long-lived in environment**
- **Swimming in untreated water**

**Let's Keep Our Perspective:
Not everyone is getting sick when they swim**

However...

Outbreaks Occur: What Do We Know About Recreational Water Outbreaks?

U.S. Waterborne Disease Surveillance

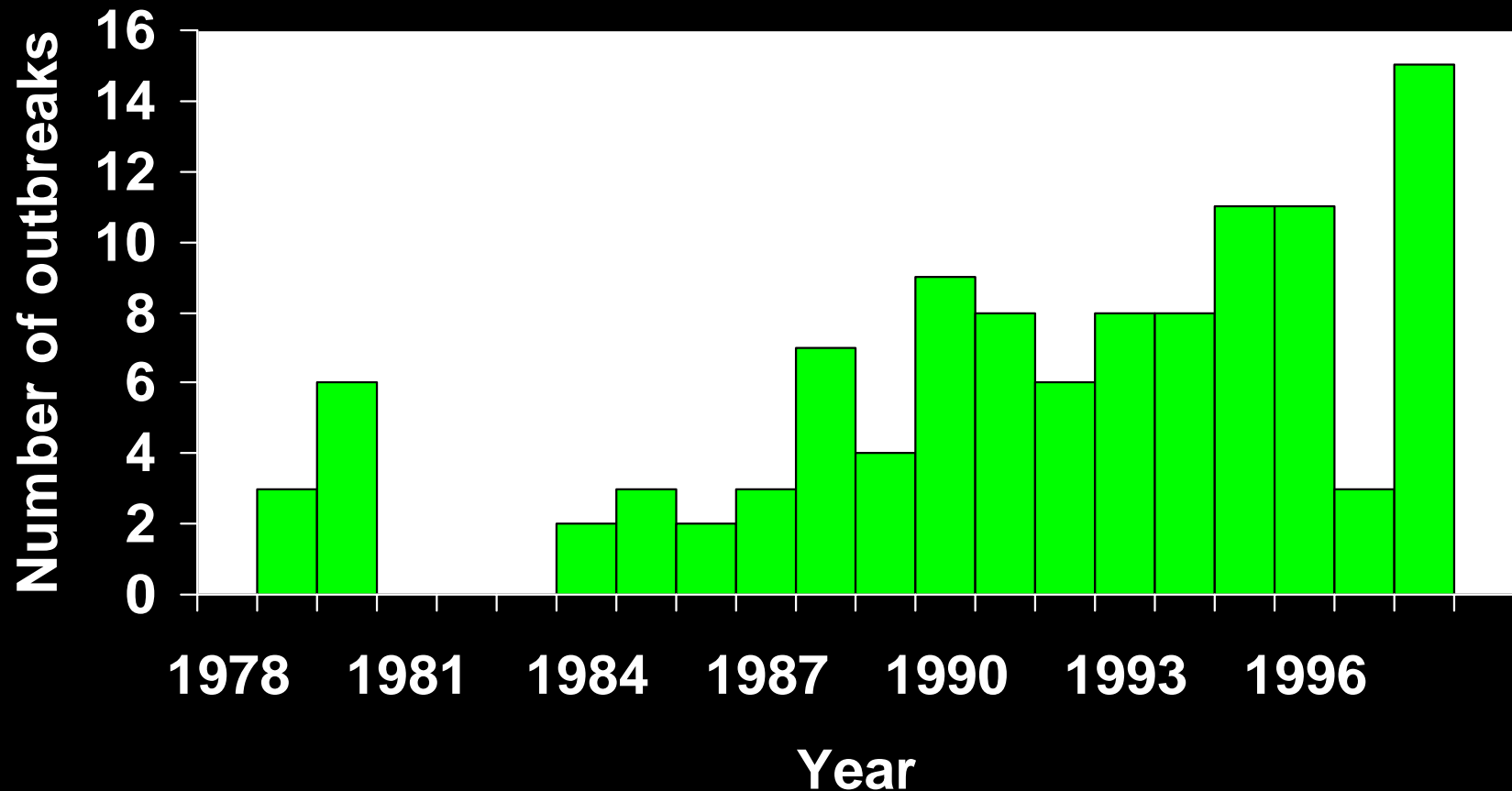
Characteristics of the Surveillance System

- **WHO: 1° responsibility for investigating WBDO's**
 - state, local, territorial health departments
- **WHAT: Voluntary passive surveillance system**
 - annual solicitation of reports from state health departs.
- **WHEN: Data reviewed, cleaned, and analyzed at CDC**
 - MMWR Surveillance Summary published every 2 years

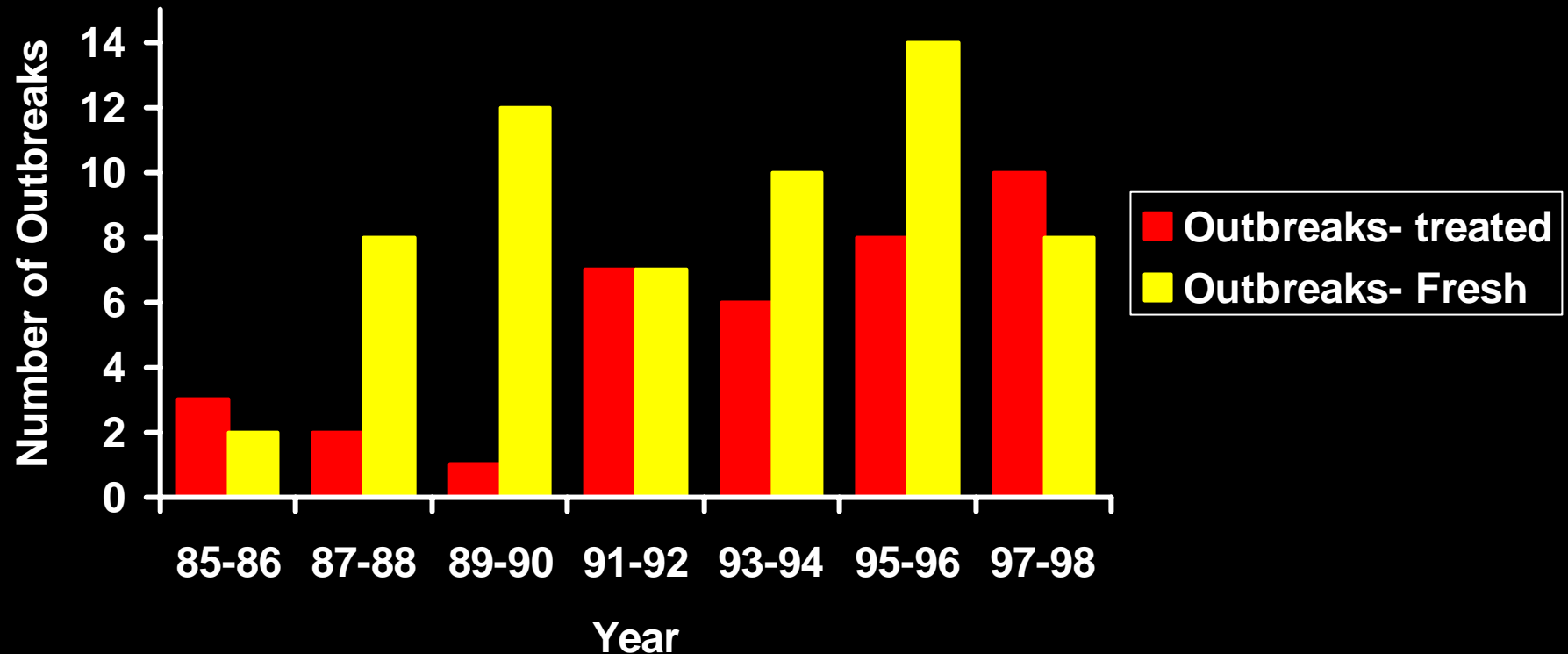
Usefulness of the Surveillance Data

- Identify new etiologic agents
- Update:
 - biology of etiologic agents
 - epidemiology of outbreaks
 - epidemiologic trends
- Establish research priorities

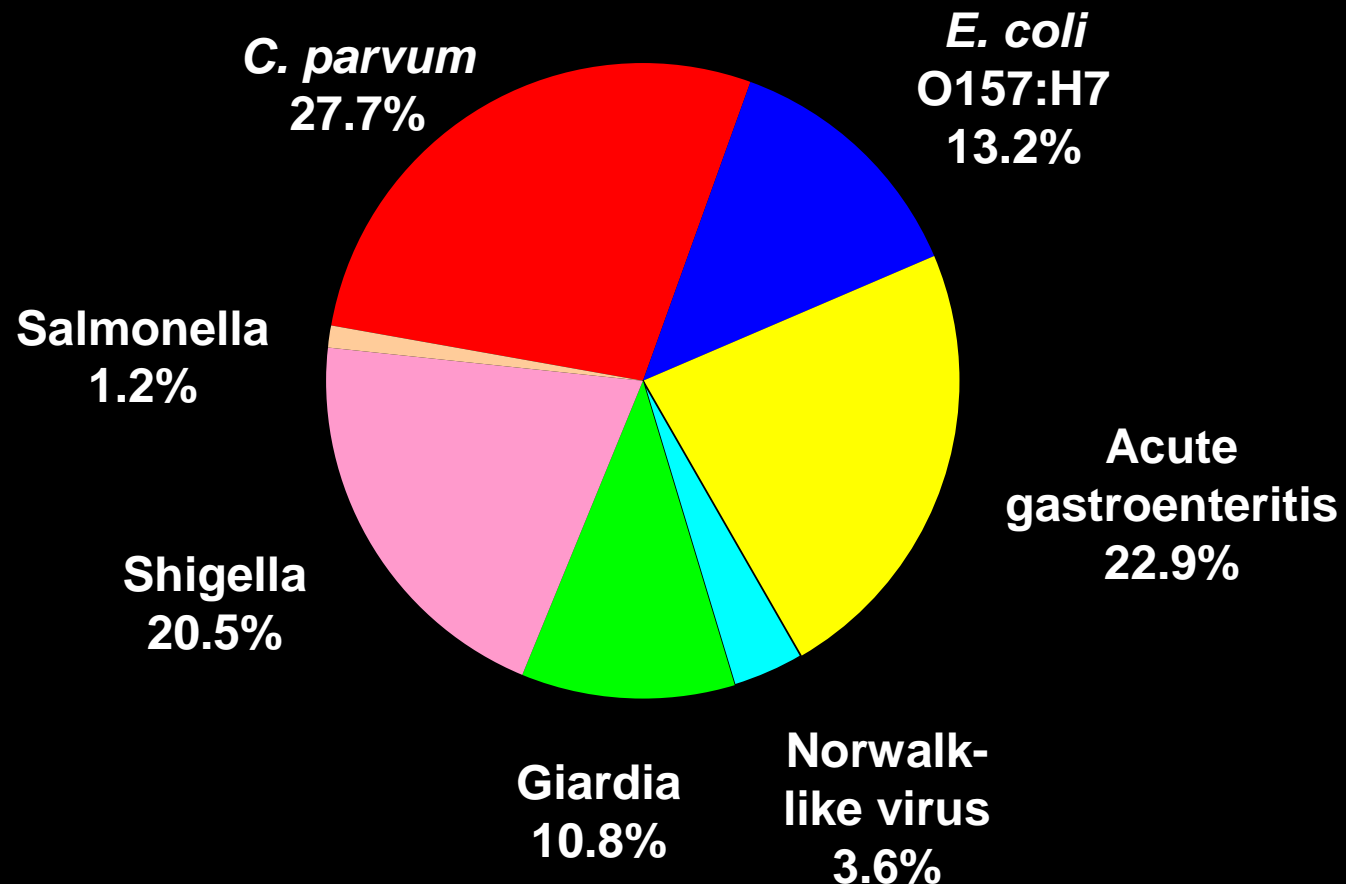
Waterborne Disease Outbreaks Associated with Recreational Water: United States, 1978-1998 (N=301), Gastroenteritis



Recreational Water Outbreaks, United States, 1985-1998: Gastroenteritis



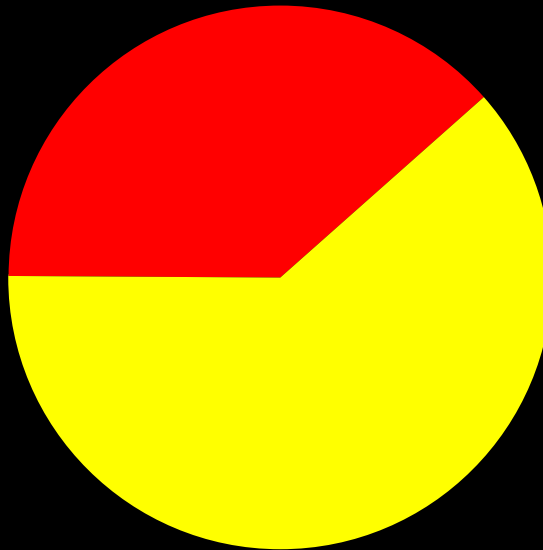
Waterborne Disease Outbreaks of Gastroenteritis Associated with Recreational Water Use: U.S., (1989-1998)



N=83

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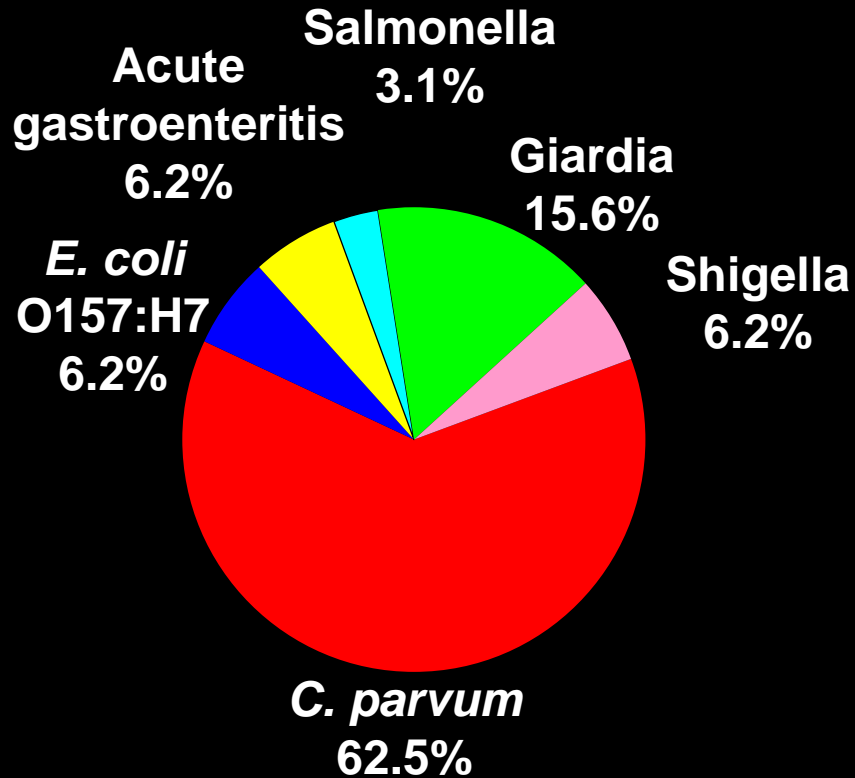
Treated Water
39%



Fresh Water
61%

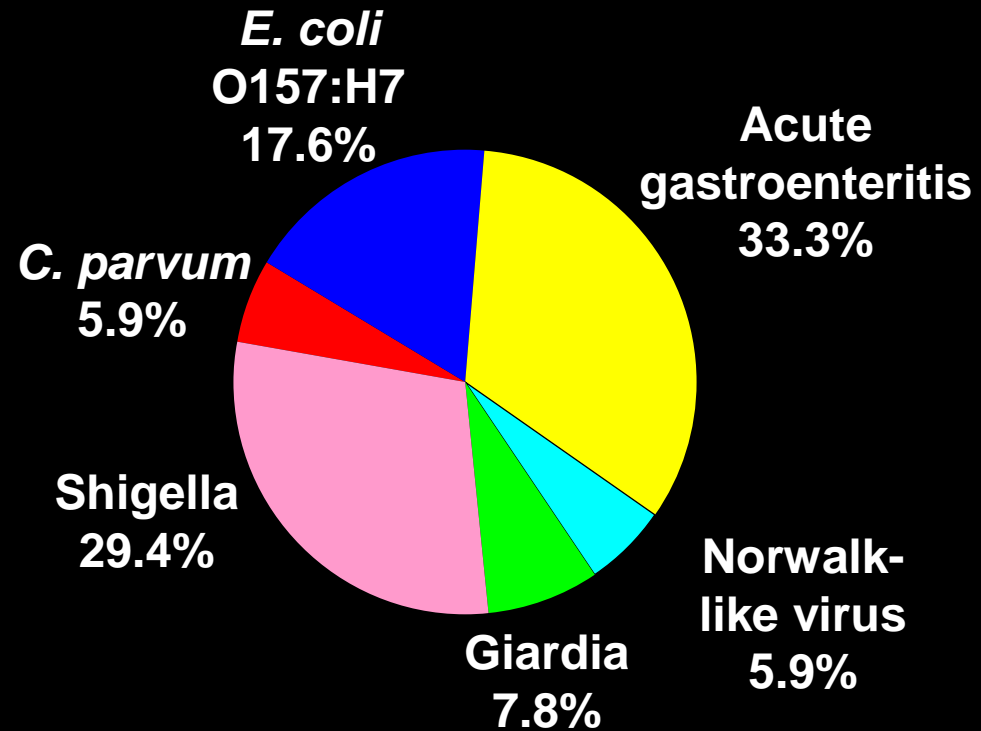
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Waterborne Disease Outbreaks of Gastroenteritis Associated with Recreational Water Use: U.S., (1989-1998)



Treated Water

N=32



Fresh Water

N=51

Limitations of the Surveillance System

- **Outbreak reporting is not consistent**
- **Not reported in “real” time**
- **Sensitivity is unknown**
 - **primary cause of under-reporting is probably under-recognition**

Limitations Affecting the Representativeness of Recreational Water Surveillance

- **Few people with diarrhea visit a physician**
- **Limited testing for some pathogens**
- **Low public/MD awareness of transmission potential results in limited reporting**
- **Sporadic nature of exposure may not result in “outbreak” detection**
 - **more severe illness is more likely to be reported**
- **May get less attention/follow-up/resources compared to foodborne outbreaks**

Fecal Contamination Occurs Routinely in Swimming Venues

Modes of Fecal Contamination of Recreational Water

- Point source
 - sewage outflow
- Non-point source
 - animal--urban/pastureland/forestland runoff
 - Human (localized and temporal which may be harder to detect)
 - swimmer to swimmer
 - untreated dumping -- pleasure craft, houseboats, septics

Human Fecal Contamination Occurs Routinely in Swimming Venues

- **Communal bathing**
- **Heavy use by diaper/toddler-aged children**
- **Significant incidence of diarrhea in U.S. (~11%/month)**
- **> 2% fecal incontinence in U.S.**
- **~0.1g of feces on typical adult bottom**
- **Identity/prevalence of pathogens in fecal accidents?**

E coli O121:H19 Outbreak: July, 1999

- **Initial notice:**
 - 2 children hospitalized. Children didn't know each other but vacationed at the same lake
- **Magnitude: 11 persons ill, 3 hospitalized**
- **Results:**
 - Ill persons only swam at one beach on the lake
 - Ill persons swam on July 17/18,
 - no livestock grazing, no pathogen in local wildlife surveyed
 - toddler with onset of diarrheal illness 7/16 was swimming during 7/16-21
 - beach area was shallow with poor circulation

Prevention??

Prevention: Maintaining Recreational Water Quality in Natural Waters

- **Monitoring water quality**
 - beach closures, monitored contaminant levels, point source discharges, fish/shellfish contaminants, # outbreaks
 - Improved and faster detection methods
- **Surrogate markers and thresholds for illness**
- **Physical and biological determinants**
 - topology, weather, dilution, circulation, bather age & density
- **Education**

Education:

Health Departments/ Beach Managers

- **Raise awareness of potential human contamination**
 - do not enter water if ill with diarrhea
 - do not drink swimming water
- **Increased vigilance when other outbreaks of potentially waterborne diarrheal disease occur in surrounding area**

Conclusions

- **Recreational water outbreaks may be increasing (surveillance artifact?)**
- **Characteristics of the surveillance system affect the types of outbreaks that are identified, investigated, and reported**
- **Need to investigate methods to improve:**
 - **Timeliness: Epi-X, Listservs (ProMED, FSNet), ties with state/local authorities---environmental health staff**
 - **Recognition: public/MD education, improved sample collection, GPS**

Webpage Documents Available

- Prevention tips (in Spanish)
- FAQ's for swimmers and pool operators
- Fact sheets on *Cryptosporidium* and *Giardia*
- Guidelines for immunosuppressed persons

www.cdc.gov

- pick health topics A-Z
 - pick waterborne diseases or swimming pool safety or recreational waters